AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (original): An abnormality diagnosis system for diagnosing a presence or absence of an abnormality of a bearing unit for a railway vehicle axle, comprising:

a sensing/processing portion for outputting a signal generated from the bearing unit as an electric signal;

a calculating/processing portion for making an abnormality diagnosis of the bearing unit based on an output of the sensing/processing portion;

a result outputting portion for outputting a decision result of the calculating/processing portion; and

a controlling/processing portion for feeding back a control signal to a control system of the railway vehicle based on the decision result.

2. (original): An abnormality diagnosis system according to claim 1, wherein the calculating/processing portion includes

a data accumulating/distributing portion for accumulating the electric signal fed from the sensing/ processing portion and distributing the signal to an appropriate distributing route according to a type of the electric signal,

an analyzing portion for calculating a predetermined physical quantity in regarding to the

bearing unit based on the electric signal distributed from the data accumulating/ distributing

portion,

a first data saving portion for saving bearing unit data in regarding to the bearing unit,

a comparing/deciding portion for making the abnormality diagnosis of the bearing unit by

comparing/referring an analyzed result of the analyzing portion with the bearing unit data saved

in the first data saving portion, and

a second data saving portion for saving the analyzed result of the analyzing portion and a

decision result of the comparing/deciding portion.

3. (original): An abnormality diagnosis system according to claim 2, wherein the

analyzing portion includes

a filtering processing portion for removing a noise component of the electric signal fed

from the calculating/ processing portion or extracting a particular frequency component to

output, and

a frequency analyzing portion for executing a frequency analysis of a signal output from

the filtering processing portion, and

the comparing/deciding portion makes the abnormality diagnosis of the bearing unit

based on a result of the frequency analysis of the frequency analyzing portion.

4. (previously presented): An abnormality diagnosis system according to claim 2 , wherein the analyzing portion has a temperature analyzing portion that calculates a temperature of the bearing unit based on the signal output from the data accumulating/distributing portion, and

the comparing/deciding portion makes the abnormality diagnosis of the bearing unit based on the temperature calculated by the temperature analyzing portion.

5. (previously presented): An abnormality diagnosis system according to claim 2, wherein the analyzing portion has a rotation analyzing portion that calculates a rotation speed of the bearing unit based on the signal output from the data accumulating/distributing portion, and

the comparing/deciding portion makes the abnormality diagnosis of the bearing unit based on the rotation speed calculated by the rotation analyzing portion.

6. (previously presented): An abnormality diagnosis system according to claim 1, wherein the calculating/processing portion outputs data saved in the second data saving portion to the controlling/processing portion in response to the abnormality diagnosis result.

7. (previously presented): An abnormality diagnosis system according to claim 1, wherein the filtering processing portion extracts only a frequency component of 1 kHz or less.

8. (previously presented): An abnormality diagnosis system according to claim 1,

wherein a sensing element of the sensing/ processing portion is arranged on a stationary portion

of the bearing unit in a loading range.

9. (previously presented): An abnormality diagnosis system according to claim 1,

wherein the data accumulating/distributing portion does not output the electric signal containing

a noise component, which exceeds a predetermined level, to the analyzing portion.

10. (previously presented): An abnormality diagnosis system according to claim 1,

wherein the comparing/deciding portion makes the abnormality diagnosis of the bearing unit by

comparing levels of a frequency due to the abnormality and its higher harmonics with a reference

value.

11. (previously presented): An abnormality diagnosis system according to claim 1,

wherein the comparing/deciding portion decides that the abnormality is generated when at least

one of peak values of the frequency due to the abnormal and its higher harmonics is larger than a

predetermined reference value.

12. (previously presented): An abnormality diagnosis system according to claim 1,

wherein the comparing/deciding portion estimates a degree of damage of the bearing unit based

on the peak values of the frequency due to the abnormal and its higher harmonics.

13. (previously presented): An abnormality diagnosis system according to claim 1, wherein the comparing/deciding portion makes the abnormality diagnosis by comparing the levels of the frequency due to the abnormal and its higher harmonics.

14. (previously presented): An abnormality diagnosis system according to claim 1, wherein the comparing/deciding portion makes the abnormality diagnosis based on a square mean or a partial overall of a frequency band containing the frequency due to the abnormal.

15. (previously presented): An abnormality diagnosis system according to claim 1, wherein the comparing/deciding portion makes the abnormality diagnosis by applying a cepstrum analysis to a frequency spectrum.

16. (previously presented): An abnormality diagnosis system according to claim 1, wherein the signal is transmitted between the sensing/processing portion and the calculating/processing portion and the calculating/processing portion and the controlling/processing portion via a cable that has waterproof, oil-resistant, dustproof, rust-preventive, and moisture-proof functions, and heat-resistant, voltage-proof, and electromagnetic noise-resistant properties respectively.

17. (previously presented): An abnormality diagnosis system according to claim 1,
wherein a radio communicating device is provided to the sensing/processing portion and the
calculating/ processing portion and the calculating/processing portion and the
controlling/processing portion respectively, and the signal is transmitted therebetween by using
the radio communicating device via radio.

18. (previously presented): An abnormality diagnosis system according to claim 1,
wherein the signal is transmitted between the sensing/processing portion and the
calculating/processing portion and the calculating/processing portion and the
controlling/processing portion via the cable that has waterproof, oil-resistant, dustproof, rust-
preventive, and moisture-proof functions, and heat-resistant, and electromagnetic noise-resistant
properties respectively, or the signal is transmitted therebetween by using the radio
communicating device.

19. (previously presented): An abnormality diagnosis system according to claim 1,
wherein the abnormality diagnosis is made in real time.

20. (previously presented): An abnormality diagnosis system according to claim 1,
wherein the abnormality diagnosis is made at a time different from a vehicle traveling time,
based on data accumulated in the data accumulating/distributing portion.

7

21. (previously presented): An abnormality diagnosis system according to claim 1,
wherein the presence or absence of the abnormality of a bearing in the bearing unit and an
abnormality occurring location are diagnosed.

22. (previously presented): An abnormality diagnosis system according to claim 1,
wherein a flat portion of a wheel is diagnosed.

23. (previously presented): An abnormality diagnosis system according to claim 1,
wherein the presence or absence of the abnormality of a gear in the bearing unit and an
abnormality occurring location are diagnosed.

24. (original): An abnormality diagnosis system for a machinery facility having a
rotating body, comprising:

a sensor unit having a sensor fitted to a constituent parts of the rotating body to sense a
physical quantity of the rotating body in a rotating operation;

a calculating/processing portion for deciding a presence or absence of an abnormality of
the rotating body by analyzing an output signal of the sensor unit and then comparing an
analyzed result with predetermined reference data; and

a controlling/processing portion for displaying the analyzed result of the
calculating/processing portion and a decision result of the calculating/processing portion, and
controlling an operation of the machinery facility in response to the decision result.

25. (original): An abnormality diagnosis system according to claim 24, wherein the sensor unit has an output amplifying means for amplifying the output signal of the sensor.

26. (previously presented): An abnormality diagnosis system according to claim 24, wherein the sensor unit has a radio communicating means for transmitting the output signal to the calculating/ processing portion via radio.

27. (original): An abnormality diagnosis system according to claim 26, wherein the calculating/processing portion and the controlling/processing portion are provided to a monitoring base station that is remote from the rotating body.

28. (original): An abnormality diagnosis system according to claim 27, wherein the sensor unit is fitted to a bearing of a railway vehicle, and

the sensor unit diagnoses the abnormality of the bearing.

29.-37. (canceled).

38. (currently amended): A condition monitoring method for a machinery facility having at least one of a rotating body and a sliding member, comprising the steps of:

analyzing a predetermined physical quantity of the machinery facility based on a signal generated from the machinery facility;

provisionally diagnosing a presence or absence of an abnormality of the machinery facility by comparing/allocating an analyzed result with information serving as references to decide whether or not the abnormality is present in the machinery facility, ~~every~~ upon elapse of a first time period; and

diagnosing the presence or absence of the abnormality of the machinery facility and an abnormal location, by executing a total evaluation, which decides the abnormality when a number of times the abnormality is provisionally diagnosed exceeds a threshold value, after a comparison/allocation is executed a predetermined number of times or based on a compared/allocated result obtained ~~every~~ upon elapse of a second time period.

39. (currently amended): A condition monitoring method for a machinery facility having at least one of a rotating body and a sliding member, comprising the steps of:

analyzing a predetermined physical quantity of the machinery facility based on a signal generated from the machinery facility;

provisionally diagnosing a presence or absence of an abnormality of the machinery facility by comparing/allocating an analyzed result with information serving as references to decide whether or not the abnormality is present in the machinery facility, ~~every~~ upon elapse of a first time period; and

diagnosing the presence or absence of the abnormality of the machinery facility and an

abnormal location, by executing a total evaluation, which decides a degree of the abnormality

according to a number of times the abnormality is provisionally diagnosed, after a

comparison/allocation is executed predetermined number of times or based on a

compared/allocated result obtained ~~every~~ upon elapse of a second time period.

40. (currently amended): A machinery facility condition monitoring method according to

claim 38 , wherein the signal is A/D-converted into a digital signal, then a process of analyzing a

frequency of the digital signal is executed, and then a frequency component generated due to a

damage of the machinery facility and calculated based on an operating signal of the machinery

facility is compared/allocated with a frequency component derived based on actually measured

data ~~every~~ during the first time period.

41. (original): A machinery facility condition monitoring method according to claim 40,

wherein the signal is subjected to an amplifying process and a filtering process.

42. (previously presented): A machinery facility condition monitoring method according

to claim 40 , wherein at least one of the rotating body and the sliding member of the machinery

facility is any one of rolling bearing, ball screw, linear guide, and linear ball bearing, and the

operating signal of the machinery facility is either a rotation speed signal in the rolling bearing

and the ball screw or a moving speed signal in the linear guide and linear ball bearing.

43. (previously presented): A machinery facility condition monitoring system for a machinery facility having at least one of a rotating body and a sliding member and using the condition monitoring method set forth in claim 38, comprising:

at least one sensing/processing portion for sensing a signal generated from the machinery facility;

a calculating/processing portion having a microcomputer that executes a calculating process to decide a condition of the machinery facility based on the signal output from the sensing/processing portion; and

a controlling/processing portion having at least one of a result outputting portion that outputs a decision result of the calculating/processing portion and a controller that feeds back a control signal to a control system of the machinery facility based on the decision result.

44. (original): A machinery facility condition monitoring system according to claim 43, wherein at least one of the sensing/ processing portion and the microcomputer is installed into the rotating body and the sliding member.

45. (previously presented): A machinery facility condition monitoring system according to claim 43 , wherein at least one of the rotating body and the sliding member is a bearing to which a radial load is applied, and

the sensing/processing portion is fixed in a radial load loading range of a bearing housing

that is fitted onto a raceway ring of the bearing.

46. (previously presented): An abnormality diagnosis system for a railway vehicle

bearing unit using the machinery facility condition monitoring system set forth in claim 43.

47. (previously presented): An abnormality diagnosis system for a windmill bearing unit

using the machinery facility condition monitoring system set forth in claim 43.

48. (previously presented): An abnormality diagnosis system for a machine tool spindle

bearing unit using the machinery facility condition monitoring system set forth in claim 43.

49. (original): A machine equipment abnormality diagnosis system comprising:

a sensing/processing portion having a sensor unit that is fixed to a bolt screwed into a

housing of the machine equipment and outputs a signal generated from the machine equipment

as an electric signal;

a calculating/processing portion for making an abnormality diagnosis of the machine

equipment based on an output of the sensing/processing portion; and

a controlling/processing portion for feeding back a control signal to a control system of

the machine equipment based on a result of the abnormality diagnosis.

50. (previously presented): A machine equipment abnormality diagnosis system according to claim 49, wherein the calculating/processing portion includes

the calculating/processing portion includes

a data accumulating/distributing portion for accumulating the electric signal fed from the sensing/ processing portion and distributing the signal to an appropriate distributing route according to a type of the electric signal,

an analyzing portion for calculating a predetermined physical quantity in regarding to the machine equipment based on the electric signal distributed from the data accumulating/ distributing portion,

a first data saving portion for saving machine equipment data in regarding to the machine equipment,

a comparing/deciding portion for making the abnormality diagnosis of the machine equipment by comparing the physical quantity calculated by the analyzing portion with the machine equipment data saved in the first data saving portion,

a second data saving portion for saving the analyzed result of the analyzing portion and a result of the abnormality diagnosis of the comparing/deciding portion.

51. (previously presented): A machine equipment abnormality diagnosis system according to claim 49 , wherein the calculating/processing portion and the controlling/processing portion are composed of a microcomputer or an IC chip.

52. (previously presented): A machine equipment abnormality diagnosis system

according to claim 49, wherein the signal is transmitted between the sensing/processing portion

and the calculating/processing portion or the calculating/processing portion and the

controlling/processing portion without a wire connection.

53.-59. (canceled).

60. (currently amended): ~~A bearing unit according to claim 53~~A bearing unit including

an inner ring having an inner ring raceway surface, an outer ring having an outer ring raceway

surface, a plurality of rolling elements arranged relatively rotatably between the inner ring

raceway surface and the outer ring raceway surface, and a retainer for holding rollably the rolling

elements, whereby a bearing to which a radial load is applied is arranged in a bearing housing,

     the bearing unit comprising:

     an abnormality sensing means provided in a loading range of the bearing housing,

for sensing an abnormality from at least one selected from a vibration sensor and a temperature

sensor installed/fixed in a single case, wherein a filtering processing portion for removing an

unnecessary frequency band from a vibration waveform from the vibration sensor, an envelope

processing portion for detecting an absolute value of a filtered waveform transferred from the

filtering processing portion, a frequency analyzing portion for analyzing a frequency of a

waveform transferred from the envelope processing portion, a comparing/collating portion for

comparing a frequency generated due to a damage calculated based on a rotation speed with a

frequency derived based on actually measured data, and a result outputting portion for

identifying a presence or absence of the abnormality and an abnormal location based on a

compared result in the comparing/collating portion are provided.

61. (currently amended): A machinery facility condition monitoring method according to

claim 39, wherein the signal is A/D-converted into a digital signal, then a process of analyzing a

frequency of the digital signal is executed, and then a frequency component generated due to a

damage of the machinery facility and calculated based on an operating signal of the machinery

facility is compared/allocated with a frequency component derived based on actually measured

data ~~every~~ measured during the first time period.